

II. REMARKS

Applicant respectfully requests acknowledgment of the Information Disclosure Statement filed in this application, dated October 28, 2001, a copy of which is attached. The current application has been reviewed in light of the Office Action mailed October 8, 2003. Claims 1, 42-56, and 59-110 are pending in this case.

Claim 1 is amended to recite an embodiment of the inventive method comprising protruding features and recessed features wherein at least one feature has a lateral dimension of 100 nm or less. (Specification page 7, lines 3-4; Figure 7). Claim 1 is further amended to replace the term "relief" with the term "film". Claim 54 is amended to correct a minor typographical error, replacing "where in" with "wherein". Claim 59 has been amended to properly depend from Claim 51 and make clear that the film deposited on the substrate comprises a multilayer of films and "the pattern formed in one layer of the multilayer of films is used as a mask to pattern the underlying layers in the multilayer".

Claims 60-110 are new. Claim 60 is new and is directed to the subject matter originally claimed in Claim 58 with proper antecedent basis for the term "the mask". Claim 61 is new and recites the inventive method wherein "the pattern formed in the film has at least one feature with a lateral dimension of 70 nm or less". (Specification page 13, line 32; Figure 4). Claim 62 is new and recites the inventive method wherein "the pattern formed in the film has at least one feature with a lateral dimension of 50 nm or less". (Specification, page 2, lines 16-18; page 2, lines 25-27; Figures 2 and 6). Claim 63 is new and recites the inventive method wherein "the pattern formed in the film has at least one feature with a lateral dimension of 25 nm or less". (Specification, page 7, lines 14-21; page 7, lines 2-5; Figures 2 and 6).

Claims 64-83 are new and are directed to an alternative embodiment of the inventive method wherein the film comprises a material that is substantially insoluble in organic liquids. (Specification, page 12, lines 7-10). Claims 84-102 are new and are directed to an alternative embodiment of the inventive method wherein the film comprises a multilayer film. (Specification, page 12, lines 15-18 and 29-31).

Claims 103, 105, 106 and 107 are new and are directed to an alternative embodiment of the inventive method comprising a mold comprising a first protruding feature and a recess formed thereby and a second protruding feature spaced apart from the first protruding feature, the first and second protruding features and the recess having a shape forming a mold pattern and

providing at least one mold pattern lateral dimension of 150 nm or less. (Specification, page 7, lines 2-5; Figures 2 and 6). Claims 104 and 108-110 are new and are directed to alternative embodiment of the inventive method comprising a mold comprising a protruding feature and a recess formed thereby, the protruding feature and the recess having a shape forming a mold pattern wherein at least one mold pattern lateral dimension is 125 nm or less. (Specification, page 7, lines 2-5; Figures 2 and 6).

For at least the reasons set forth below, Applicant respectfully submits that independent Claims 1, 64, 84, and 103 and 104 are in condition for allowance. Further, Claims 42-63, 65-83, 85-102 and 105-110, as dependent on allowable independent Claims 1, 64, 84, 103 and 104, are also in condition for allowance. Favorable consideration of the currently pending claims is respectfully solicited.

III. THE 35 U.S.C. §112, SECOND PARAGRAPH, REJECTIONS OF CLAIMS 57-59

Claims 57-59 stand rejected under 35 U.S.C. §112, second paragraph, as indefinite for failing to point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner rejected Claims 57 and 58 as indefinite "in reciting 'the pattern in the mask material' when in fact no mask material has been set forth previously." (Office Action, page 2, section 1). With respect to the indefiniteness rejection of Claim 59, the Examiner argued "[i]n claim 59, it should be clearly set forth that the 'one layer of a multilayer film' is in fact constituted by the film that is deposited on the substrate in claim 1." (Office Action, page 2, section 1).

Applicant has amended the claims to alleviate any ambiguity. Claims 57 and 58 have been canceled without prejudice. Claim 59 has been amended to make clear that the film deposited on the substrate comprises a multilayer of films and "the pattern formed in one layer of the multilayer film is used as a mask to pattern the underlying layers in the multilayer". (See Amended Claim 59). Claim 60 is new and is directed to the subject matter originally claimed in Claim 58. Claim 60 depends upon amended Claim 59, thereby providing proper antecedent basis for "the mask material". In light of the amendments, the §112 rejections have been obviated. Accordingly, withdrawal of the 35 U.S.C. §112, second paragraph, rejections is respectfully solicited.

IV. REJECTIONS UNDER 35 U.S.C. § 103

Claims 1, 42-59 stand rejected under 35 U.S.C. § 103(a) as unpatentable in view of U.S. Patent Number 4,731,155 to Napoli et al. ("Napoli") and European Patent Application 244,884 (the "'884 Application"). Specifically, the Examiner argues Napoli discloses the basic claimed lithographic method for forming a pattern in a film carried on a substrate". (Office Action, page 2, section 2). The Examiner notes "the primary reference (Napoli) fails to teach the improvement wherein the mold has a release material bonded thereto", but argues that "European -884 discloses this exact release material bonded to an inorganic mold". (Office Action, page 2, section 3). The Examiner continues "[i]t certainly would have been obvious to have modified the mold of Napoli et al as taught by European -884 to facilitate the release of the patterned film from the mold." (Office Action, page 3, section 2). This rejection is believed inapplicable to the claims as amended.

To establish a *prima facie* case of obviousness, it must be shown that the references teach or suggest all the limitations of the claimed invention. MPEP 2143 (emphasis added). In the present case, Claim 1 as amended, recites a method for forming a pattern in a film carried on a substrate wherein the pattern formed in the film has "at least one feature with a lateral dimension of 100 nm or less". (See Claim 1). Napoli does not teach or suggest this limitation, does not envision that the limitation can be achieved, and does not teach or suggest how the limitation can be achieved.

In Applicant's view, the combination of Napoli and the '884 Application fails to teach or suggest all the limitations of Claim 1. There is no teaching or suggest in Napoli of a method for forming a pattern in a film having feature sizes of 100 nm or less. Instead, Napoli discloses a method useful only for making features as small as .6 micrometers. (Napoli, col. 3, lines 47-48). In the single example disclosed in Napoli, a resin layer is patterned using a nickel master mold "containing uniform rectangular grating patterns of 2, 0.85 and .7 micrometer wide peaks and valleys having verticle (sic) sides." (Napoli, col. 5, lines 3-6) (emphasis added). Clearly, the primary reference Napoli does not teach or suggest the patterning of small feature size disclosed in the current application.

Further, the Examiner does not provide a showing that this limitation is obvious in view of the '884 Application. The '884 Application discloses a method of providing a surface with a particular release agent. However, the '884 Application does not teach or suggest the possibility

of imprint lithography to form a pattern in a film having at least one feature with a lateral dimension of 100 nm or less. Modification of the mold of Napoli as taught by the '884 Application would not result in a method capable of generating features with a lateral dimension of 100 nm or less. Accordingly, Napoli and the '884 Application, considered alone or in combination, do not make obvious the invention of Claim 1 or the remaining claims dependent thereon.

The embodiment expressed in newly added independent Claim 103 recites a lithographic method of forming a pattern in a film wherein a first and second protruding feature together with a recess form a mold pattern. (See Claim 103). The mold pattern has at least one lateral dimension of 150 nm or less. (Specification, page 7, lines 4-5; Figures 2 and 6). Put another way, the present invention discloses a method of imprinting at least one mold pattern comprising two features and a recess which span a lateral distance of 150 nm or less. The embodiment expressed in newly added independent Claim 104 recites a mold pattern comprising a protruding feature and a recess wherein at least one mold pattern lateral dimension is 125 nm or less. (Specification, page 7, lines 4-5; Figures 2 and 6).

As discussed above, Napoli discloses the patterning of features each having a minimum size of 600 nm. (Napoli, col. 3, lines 46-48; col. 5, lines 3-6). Clearly, Napoli does not teach or suggest a method of patterning two features and a recess having a combined lateral dimension of 150 nm or less, as recited in Claim 103 nor a method of patterning one feature and a recess having a combined lateral dimension of 125 nm or less, as recited in Claim 104. Thus, Napoli fails to teach or suggest the inventions of newly added claims 103 and 104. Additionally, as discussed above, the '884 Application does not teach or suggest the imprint lithography methods capable of forming mold patterns as recited in Claims 103 and 104.

Further, Napoli fails to teach or suggest all the features of the embodiment of the current invention recited in claims 64-83. Claim 64 and the claims dependent thereon call for a method for forming a pattern in a film, wherein the film comprises a material that is substantially insoluble in organic liquids. (Specification, page 12, lines 7-10). In contrast, Napoli is directed to resist materials which are soluble in organic liquids. (Napoli, col. 3, lines 23-24).

Napoli also fails to teach or suggest the use of multilayer films as recited in Claims 84-102 of the present application. In Applicant's view, Napoli is directed to the use of a single layer of film as the embossable material on the substrate. (Napoli, col. 4, lines 51-56).

For at least these reasons, Napoli does not anticipate or make obvious the inventions of newly added claims 64-110.

V. THE DOUBLE PATENTING REJECTIONS OVER THE CHOU '905 PATENT AND '580 PATENT

Claims 1 and 42-59 have been rejected for obviousness-type double patenting over U.S. Patent Number 5,772,905 to Chou ("Chou '905 patent") and the '884 Application. Further, Claims 1 and 42-59 received an obviousness-type double patenting rejection in view of U.S. Patent Number 6,309,580 to Chou ("Chou '580 patent"). Pursuant to 37 C.F.R. 1.321(c), a terminal disclaimer is filed herewith to obviate the double patenting rejections over U.S. Patent Number 5,772,905 and U.S. Patent Number 6,309,580, both issued to Stephen Y. Chou, the Applicant in the current application. Applicant declares that the '905 and '580 patents are commonly owned with the current application. In light of the accompanying terminal disclaimer, the Applicant respectfully requests withdrawal of these rejections.

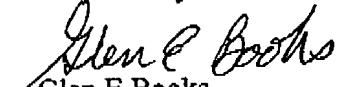
VI. PROVISIONAL DOUBLE PATENTING REJECTION OVER THE CHOU '276 APPLICATION IN VIEW OF THE '884 APPLICATION

Claims 1 and 42-59 stand provisionally rejected under obviousness-type double patenting over co-pending U.S. Application Number 10/244,276 filed by Chou ("Chou '276 Application) and the '884 Application. Upon indication of allowable subject matter Applicant will file the appropriate terminal disclaimer to overcome this rejection.

VII. CONCLUSION

In view of the above amendments and remarks, Applicant has overcome all rejections, and reconsideration is requested.

Respectfully submitted,


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